DK METER
User Manual

DK METER **– Audio & Loudness** Metering Complete

DK - Technologies

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Introduction

Before you begin...

Thank you for purchasing one of the DK Meter family members.
With the DK Meter you are well equipped to meet the growing challenges within Audio and Loudness metering.
The DK Meter complies with all major Broadcast loudness standards and delivers outstanding metering precision and clear read-outs, not merely on Loudness, but across the full range of audio metering tools.
The DK Meter toolset makes it application-fit for any audio and loudness setup in broadcast, film & post production as well as live transmission and recording.
With the clear DK Meter readout and compliance in your line of sight, you are always **safe and sound**.

Flexible & User definable

The DK Meter range holds a wide selection of audio measuring tools, including Loudness measurements compliant with all major broadcast standards.
With an open and flexible approach, DK Meter leaves it up to you to decide exactly what tools, read-outs, scales and labels you would like to use.
Your setups can be stored and recalled as user defined presets, allowing you to adapt your desired meter views on the fly.

About this manual

This manual will provide you with a quick overview of the DK Meter operation, tools and options, as well as an in-depth look at the more advanced parameters and facilities of DK Meter.
Happy reading!

Please note: DK-Technologies reserve the rights to change the content of this manual at any time. The latest revision of this manual can be downloaded from:
www.DK-Technologies.com

Other Important Notes

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Purpose

Any fitness for purpose legislation or other determination that may be applied in the area where this equipment is installed must take due cognisance that it is designed for use in professional broadcast, audio and video systems by appropriately trained personnel. The equipment is not intended for use in a domestic environment and regulations designed for such situations are not applicable.

After sales modifications

Any modifications to the equipment not specifically authorised and approved by DK-Technologies A/S may invalidate the equipment warranty. This includes changes to cabling and variations to the recommended installation as detailed in the documentation issued by DK-Technologies A/S. Modifications can invalidate EMC and safety features designed into this equipment and the manufacturer cannot be liable for any legal proceedings or problems that may arise relating to such modifications. No sales agent or other person involved in the supply chain is permitted to authorise variations from the content of this documentation.

Important Safety Instructions

- Read these instructions. Study carefully and understand all safety and operating instructions before you install and operate the unit!
- Keep these instructions. Keep all safety and operating instructions for future reference!
- Heed all warnings on the unit and in the safety and operating instructions before you install and operate the unit!
- Follow all instructions to ensure against injury to yourself and damage to the unit or other objects connected to the unit.
- To prevent possible electrical shock, death, fire, injuries and malfunctions, use this product only as specified.
- Only use attachments and accessories specified by the manufacturer.
- The units of the DK Meter range are designed for indoor use only

Quick guide

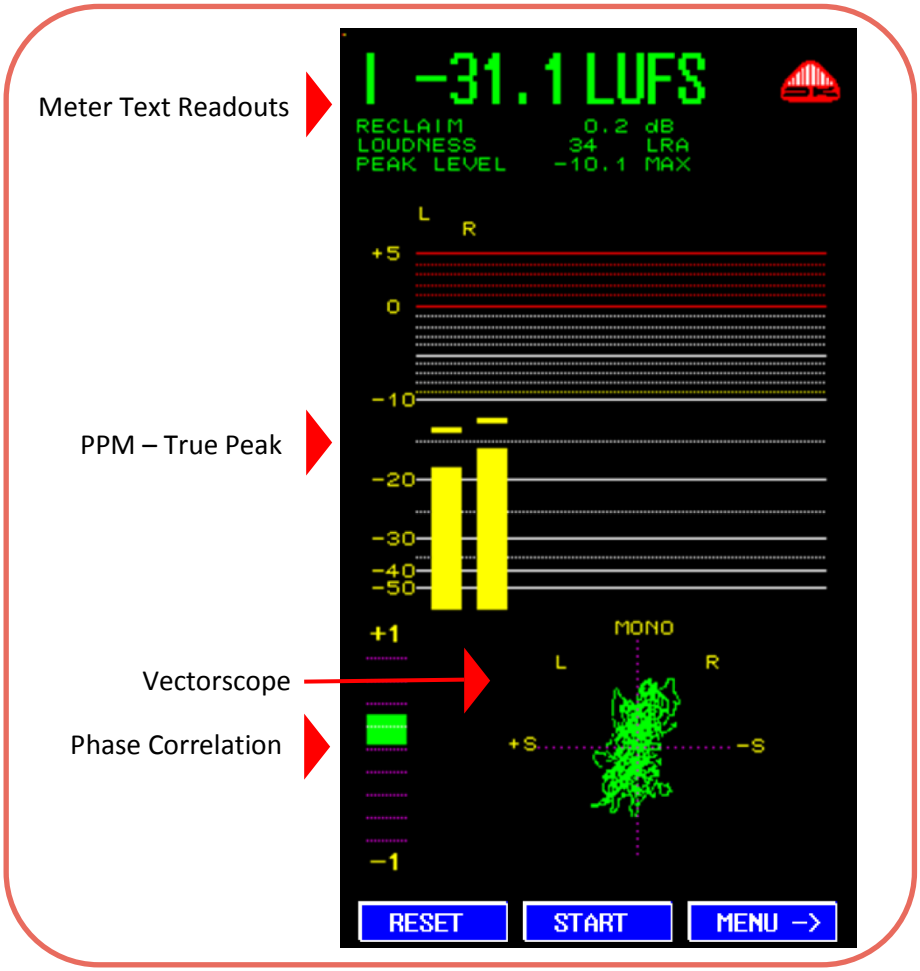
If you just want to get going

If you just want to get going with your new DK Meter right away, here are a few simple steps to get it up and running.

1. Connect the included power supply or power your meter directly from your computer USB port.
2. Powering up your meter, you will see the on-board quick setup guide – if you want to disregard that, slide across the three touch buttons from left-to-right (you can always return to the guide later).
3. Connect the DK Meter AES 1 to the appropriate audio output and play audio.
4. You will now see the default meter view in stereo or surround sound depending on your model and options (fig xx). This view includes four main sections:

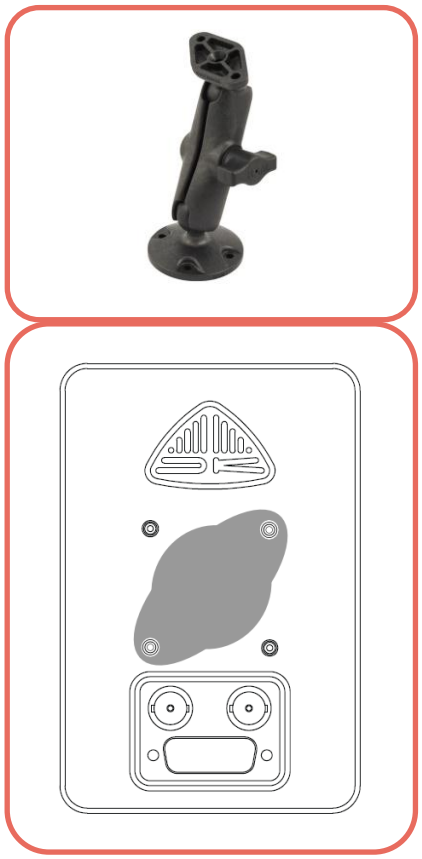
    - Meter Text Readouts – Integrated Loudness, Reclaim factor, Loudness Range and Peak Level (true peak)
    - Digital PPM – Showing True Peak
    - Vectorscope/GonioMeter – Showing sum/difference content
    - Phase Correlation – showing phase information

For more information on the individual tools, please refer to the 'display tools and options' section of this manual.



Basic Operation

Mounting your DK Meter



The DK Meter is supplied with an adjustable mounting bracket. The top piece is mounted onto the DK Meter with the two included screws, while the desktop piece is mounted with four screws.

Additional fixing options and mounts are available from DK-Technolgies.com or from RAM on http://www.rammount.com .
The included model number is: RAP-B-138U

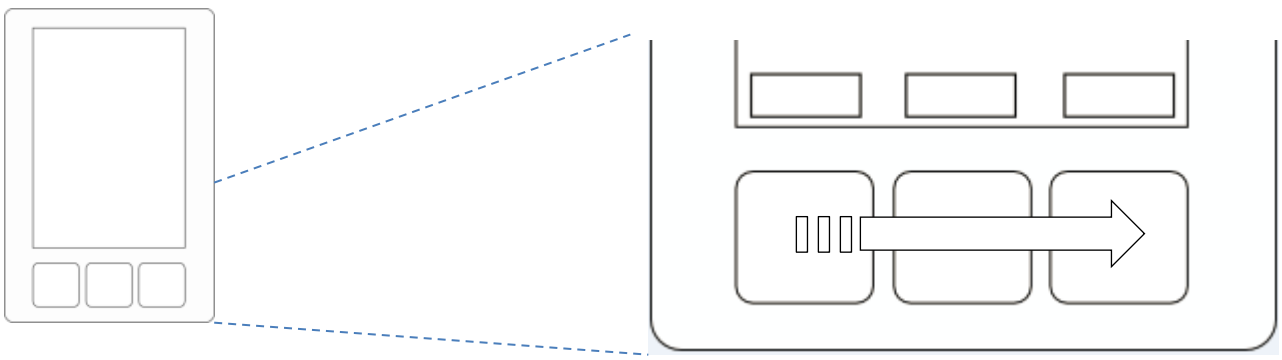
Note: When fixing the mounting plate to the rear of the meter, use only the screws supplied – damage may be caused by using longer screws, or different mounting back plate.

Power Supply

The DK Meter comes with a plug-top power supply with a USB outlet. If being used in conjunction with a computer or USB hub, any conventional USB-A outlet with the standard USB 5 volt supply may be used instead of the included power supply unit.
This elegant feature not only makes the DK Meter easier to bring along, but also conveniently allows the DK Meter to power up with the relevant computer of your setup.

Navigation

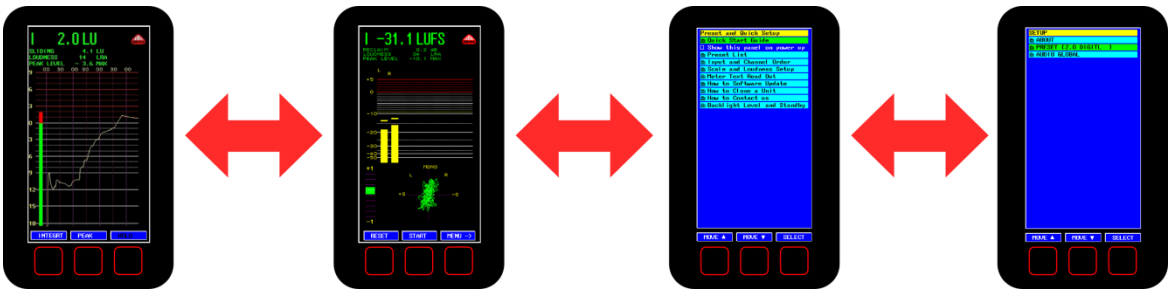
The general navigation on the DK Meter is achieved through the three capacitive touch sensitive buttons below the screen.
Each touch button corresponds to the on-screen button and dynamically changes name as relevant.



In addition, swiping across the three buttons from left-to-right or vice versa, allows you to change the overall meter view or selected menu.

Sliding Windows and Views

The sliding function described above allows you to easily move from one meter setup to another, as well as entering the background Quick setup, preset and Setup menus. Here is a quick overview of the immediate windows that you can slide between:



View2
PPM
+Loudness
History

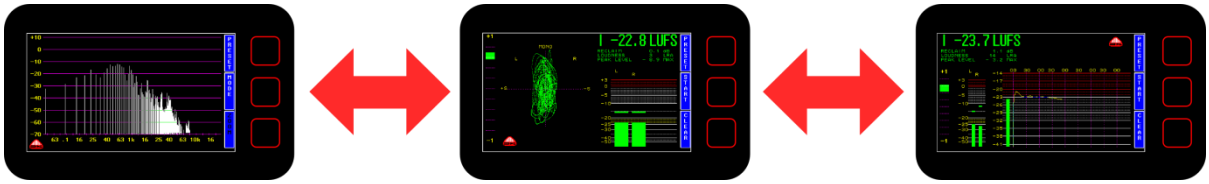
View1
PPM +
Vector-
scope

Quick
Setup
Menu

Advanced
Setup
Menu

In every DK Meter there are two basic meter views as well as 'Preset and Quick Setup' Menu and finally the 'Advanced Setup Menu'

Additionally, the DK4 meter features another three landscape views which may be obtained for DK1, DK2 and DK3 as software upgrades. This includes; two 'MSD Landscape Views' and the FFT analyzer.



View5
FFT

View4
MSD View

View3
PPM +
Loudness

Menu Navigation

When inside a menu (Quick setup or Advanced setup), the three touch buttons become your navigation. The left most button moves the cursor up, the center button moves the cursor down and the right most button becomes a 'select' function.

At any point is it possible to 'slide' across the buttons to exit the current menu.

In several of the menus, a folder structure has been designed to hold the many parameters and functions of the DK Meter.

To open a folder, move the cursor on top of the folder and press 'select'. You are now exposed to the folders inside, including potential sub-folders.
Any folder may be closed in the same manner.
Should you choose to slide away from the menu and come back later, the meter will remember the state of the menu as well as the position of the cursor, taking you right back to where you left off.

The Preset and Quick Setup

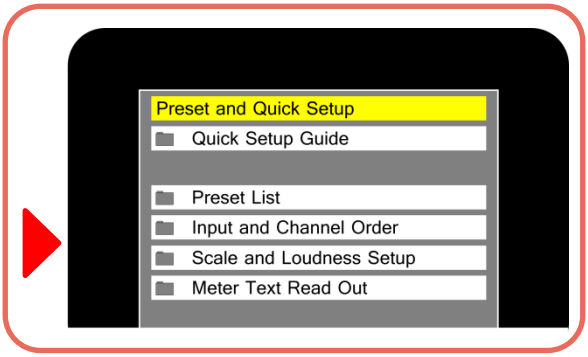
When powering up your meter for the first time, the 'Preset and Quick Setup' menu will be shown as the first display.
The Preset and Quick Setup menu, allows for a simplified and fast way of setting up you DK Meter. More advanced settings and functions are edited in the 'Setup' menu reached by sliding from right to left.

Note: The power-up showing of the Quick Start Guide may be disabled by unchecking the 'Show this panel on power up' parameter (the change is stored upon exiting to the meter viewings).

The Quick Start Guide will give you a few basic tips on operation and setting up your meter.
Let's walk through the different folders:

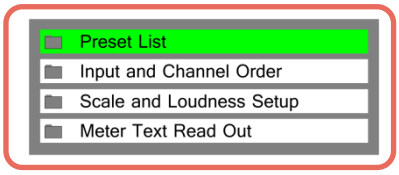
Here are the four simple steps to follow to set your meter up in a few minutes:

Step 1 **Preset List** – Select the preset you want to work with
Step 2 **Input and Channel Order** – Select your preferred input and choose your desired Loudness bar-graph
Step 3 **Scale and Loudness Setup** – Select your Scale and Loudness setup of choice
Step 4 **Meter Text Read Out** – Define what four parameters you want to see on the Meter Text Read Out.



Step 1- Preset List

The DK Meter holds a list of presets that allows you a fast starting point, as well as showcasing some of the different tools included in the Meter. Any of the presets can be edited to become a custom user preset.



Selecting a preset is as easy as moving the cursor to the desired preset on the list and hitting the 'Select' button.

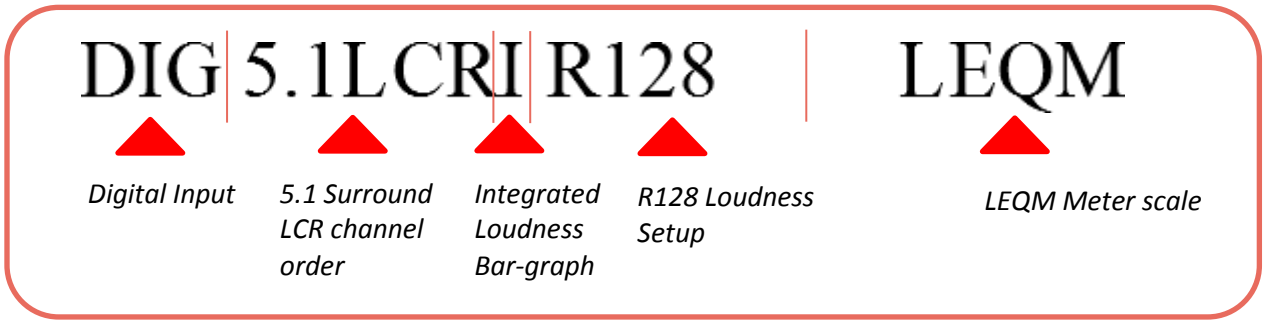
DK Meter always has a preset selected and changes are instantly stored upon exiting to the Meter view, be it; meter setup, background parameters and display appearance.

Dynamic preset naming

When advancing in the Quick Setup, the selected preset name will dynamically reflect your choices.

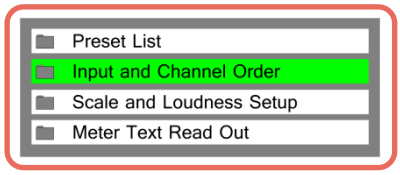
The dynamic preset name includes the following information:
Input Source – channel count and Order – Loudness Setup - Scale

Dynamic Preset Example



The naming of a preset may be customized in the 'Advanced Setup Menu' under the Audio Global/Preset Folder (see more in the 'Setup Menu' section).

Step 2 - Input and Channel Order



The Input and Channel Order section allows you to easily select both your preferred input source and the order of the incoming channels.
The list of input and channel order only displays inputs and channel setups allowed by the current meters specific hardware and software configuration.
More advanced input and channel routings may be accessed in the Advanced Setup Menu.

The following inputs may appear depending on your specific Meters ability and interfaces:

- Analogue
- Digital
- De-embed

All interfaces may be selected as 2.0, while only Digital and De-Embedded allows for 5.1 setups.

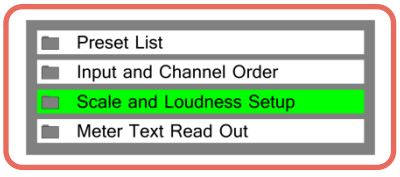
5.1 setups allow for two different channel orders:
LRC – corresponding to the EBU channel order: Left, Right, Center, LFE, Ls, Rs
LCR – corresponding to the SMTPE channel order: Left, Center, Right, Ls, Rs, LFE

Choosing 'User Def' will make the meter fall back on the settings of the more advanced 'Setup' menu, allowing you to tailor input source and channel order in more advanced ways than those offered in the Quick Setup.

Loudness Bar Type

Allows you to define if you want to see a Loudness bar next to your other Bar graphs and if so, what Loudness parameter will be indicated:
Momntry – 'Momentary Loudness'
Shorttrm– 'Short-term Loudness'
Integrt – 'Integrated Loudness'
None – Meaning no Loudness Bar graph displayed.
Momentary+Shorttrm – Dual Loudness bars of both 'Momentary' and 'Short-term' Loudness

Step 3 - Scale and Loudness Setup



This menu allows you to define exactly what scale and specs your bar graphs should perform to.
Select the desired scale by moving the cursor in place and hit 'Select'.

The scale list includes:

IEC 268 I	BBC – IEC 268 II	IIB – IEC 268 II
DIN	SMPTE VU	FBTV – DIN
NBC – Ultra VU	LEQM – RMS LEQ	ITU – RMS LEQ
DMU1 – DMU1630	DMU2 – DMU1630	40A – Dorrough
40C – Dorrough	EBU – IEC 268-18	Web Peak

Graphical Bar-graph Width

The graphical width of the bar-graphs may be altered. If set to 'Auto', the Meter will dynamically adapt the width. Selecting 'Normal' will allow you to manually define the width in the 'Setup' Menu.
Please see the 'Setup Menu' section for further details on the 'Normal' or manual width definition.

Loudness Setup

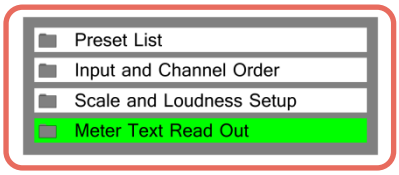
The Loudness setup parameter allows you to select between a number standardized or recommended Loudness settings including:

R128	ATSC A/85	LEQM
BCAP	TV2 DK	ABC-TV LA
HRTV-23FS	ARIB	AGCOM 219

If you select 'User' the loudness setup may be completely customized to exactly your specifications in the 'Setup Menu'.
Please see the 'Setup Menu' section for further details on the 'Normal' or manual width definition.

NOTE: The Loudness Capture mode may be set to automatic or manual. The Default setting is 'Auto' and initiates the Loudness measurement when incoming audio passes the above a -70dBFS threshold.
Please refer to Advanced Setup Menu/Loudness Setup/Capture for more information

Step 4 - Meter Text Read Out



The Meter Text Read Out allows you to customize what parameter each of the four Text read outs in the top the DK Meter screen displays.
Each of the four parameters has its own folder with the parameters that are possible to display as a Text Read out.

How to ...

The Quick Setup features a few 'How to...' descriptions.
Please refer to the complementary 'How to…' section of this manual for a detailed description and tips on how to perform specific tasks using the DK Meter.

Backlight and Standby

The backlight parameter allows you to set the brightness of your meter. Hit the 'Select' button and use arrow up/down to set the desired backlight level. De-select the backlight parameter by hitting 'Select' again.

The Standby parameter enables the meter to be put into standby mode. Hit any of the three touch sensitive buttons to wake up your meter.

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Meter Setup & Audio Routing

Automated Meter Setup

As you are probably aware by now, the DK Meter is quite a complex piece of equipment.
In order to simplify setup, the DK Meter has an integrated auto setup function that ensures that bar-graphs, loudness, vectorscope and other instruments has pre-wired inputs. For example; the bar-graphs will automatically position Left and Right channel as the first two bar-graphs and then route them onto the phase correlation meter.
Essentially this means that outside the initial input to the bar-graphs, the routing in between the different instruments inside the DK Meter is fixed and cannot be altered.

Clock Setup and Hierarchy

DK Meter has an internal clock hierarchy that first attempts to lock onto the SDI input. If no valid clock is found here, DK Meter will proceed to attempt locking to AES1. If no valid lock is found, DK Meter will fall back on its internal 48kHz clock.
If a valid clock is found on the SDI input, the DK Meter will use this as the master clock. This essentially means that relevant AES inputs needs to be synchronous with the SDI clock in order to avoid slip samples.

Hierarchy – DK Meter attempts to lock onto clocks in the following order:

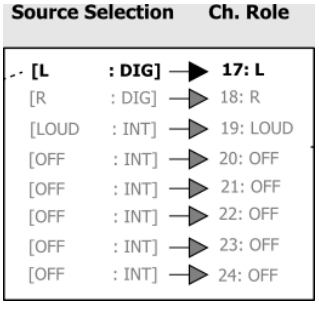
1. **SDI**
2. **AES1**
3. **Internal**

Audio Routing Setup

The audio routing of the DK Meter is highly flexible and allows for a high degree of customization.
All of the following is automatically handled by the Quick Setup, allowing you to focus on what is important - the Audio.
However, if you need to customize routing or labeling of input channels or something else, here is what you need to know (fig xx):

Source Selection (Advanced Setup; Matrix Output Assign, Meter)

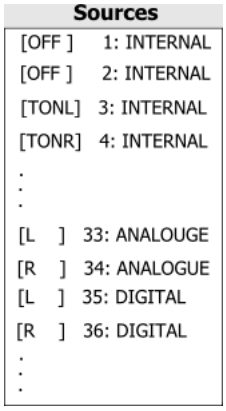
The basic routing and connection between inputs and instruments is handled in the Matrix Output Assign folder in the Advanced Setup menu.
Sources are selected from an instrument or Role point of view e.g. selecting the first role (fig xx: 17:L), you are enabled to select the appropriate source on the left hand side of the menu (L DIG).
Hitting the 'Select' button twice will bring up the Source list that you can choose from.



Source List

The Source list will display every available source of your meter including a number of internal sources with special functions that we will get back to.

This means that if your meter has de-embedded SDI channels, you will see these, just like digital and analogue sources will show if enable on your meter.



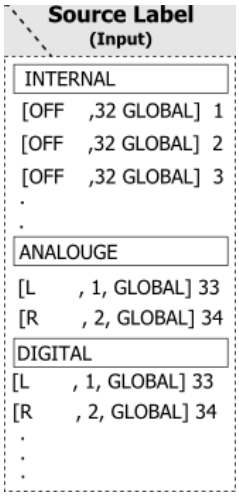
Internal Sources

As mentioned, the Meter includes a number of internal sources that has specific functions like 'Off', Sum, Difference, Loudness etc.
These come handy for setting up special functionality like a Loudness Bar-graph, or adding MS viewing to the Moving Coil emulation. Here is a list of the internal sources function:

Internal Source	Function
Off	Off
Off	Off
TonL	*For internal use*
TonR	*For internal use*
Mix	Used for Sum (M) signal in MS viewings, or as Left ch. when in Downmix mode
Diff	Used for Diff (S) signal in MS viewings, or as Right ch. when in Downmix mode
Loud	For Loudness Bar

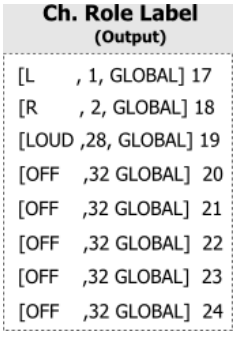
Source Labels – (Input) (Advanced Setup; Labels Assign, Input)

The Meter includes a list of default names/labels for all the available sources. However, these may be changed completely to your liking.
This comes in handy when you want to label your sources with more relevant names e.g. L OB Van or TV1 or what-ever is relevant for you.
The Source Labels menu allows you to do exactly that.
In the Advanced Setup menu, select the Labels Assign folder, go to Input and select the source you want to re-label.
Now choose the label you prefer from the Global Label Master.



Channel Role Label (Output) (Advanced Setup; Labels Assign, Output)

Similar to the 'Source Labeling' the channel Role may be re-labeled as well.
This is the label that is indicated on display above the relevant Bar-graph.
In the Advanced Setup menu, select the Labels Assign folder, go to Output and select the role you want to re-label.
Now choose the label you prefer from the Global Label Master.
Please note that the Automated Meter Setup function relies on certain roles to avails be labeled correct e.g. Left, Right, Center, LFE, Ls, Rs are all used to setup the StarFish™ correctly.

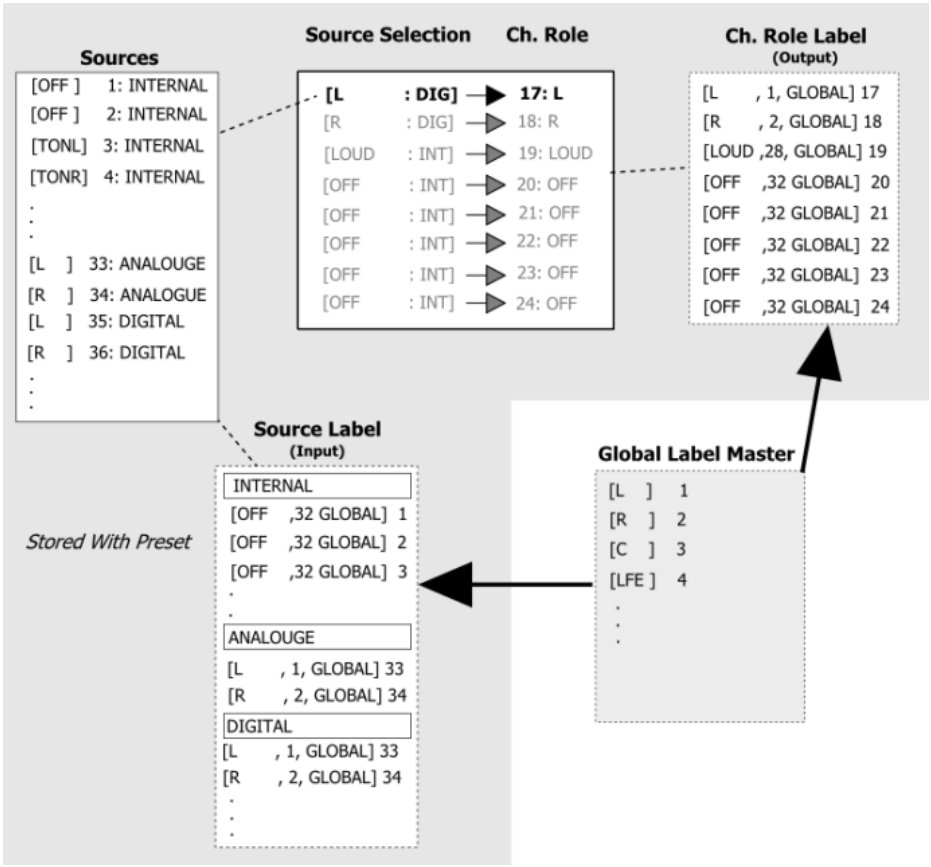


Global Label Master (Advanced Setup; Audio Global, Labels, Signal)

The Global Label Master is a default list of all the labels available for Source and Channel Role labeling.
Each of the Master labels may be altered to your liking, meaning that you can completely customize the labeling of both incoming sources and roles.

Audio Routing parameters included in preset

All of the above outlined Audio routing and re-label functions are stored instantly in the current preset, with the Global Label Master as the only exception.
This means that your routing and labeling may be completely altered by the flick of a preset change, while the Global Label Master stays fixed independent of preset changes.



The Advanced Setup Menu

The Setup Menu

The Setup Menu holds the access to all of the background parameters of your DK Meter. In order to understand the functionality, it is important for you to read through the different sections.

Many of the parameters will alter preset parameters and hence are instantly stored. Therefor it might be relevant to select the desire preset to be edited before proceed with customizing your meter setting in the Setup Menu.

NOTE: If you are looking to change a specific feature or function it might be relevant to look at some of the examples in the 'How to' section of this manual.

About – User Mode & User Restrictions

DK Meter has three levels of user access, allowing for the meter to be protected against unintended changes to its setup.
The three levels are:

- Restricted
- Normal
- Administrator (default)

The Administrator mode gives full access to storing, changing setups etc etc. Administrator mode is the default setting of the DK Meter.
Normal mode, like Administrator, has access to all parameters, however, no settings are stored, meaning that a re-boot of the meter will take it back to the power up starting point.
Finally, the Restricted mode only allows meter views and access to functions residing inside the Meter views i.e. no access to setup parameters or storing of parameters.
In order to exit the Restricted mode, you need to 'slide' five times to the right. This will give you access to the setup modes and allow for the user mode to be changed.

Preset – Folder

The Preset folder contains detailed parameters for setting both audio routing, meter displays and Loudness settings. The follow paragraphs explain each sub menu and its functionality.

Matrix Output Assign – Selecting your Meter Source

The Matrix Output Assign/Meter folder lets you choose what source is routed to your Bar-graph display.
Please refer to the Meter Setup and Audio Routing section for further information.

Meter Setup

The Meter Setup folder holds a number of parameters that allows you to customize the behavior and appearance of your Meter.

Scale

This menu allows you to define exactly what scale and specs your bar graphs should perform to.
Select the desired scale by moving the cursor in place and hit 'Select'.
The scale list includes:

IEC 268 I	BBC – IEC 268 II	IIB – IEC 268 II
DIN	SMPTE VU	FBTV – DIN
NBC – Ultra VU	LEQM – RMS LEQ	ITU – RMS LEQ
DMU1 – DMU1630	DMU2 – DMU1630	40A – Dorrough
40C – Dorrough	EBU – IEC 268-18	Web Peak

Display mode

Allows you to select whether the Bar-graph width is auto scaled or if you want to manually ('Normal') define the individual Bar-graph appearances.
Additionally, switch from Bar-graph to 'Moving Coil' or 'Moving Coil Dual' mode.

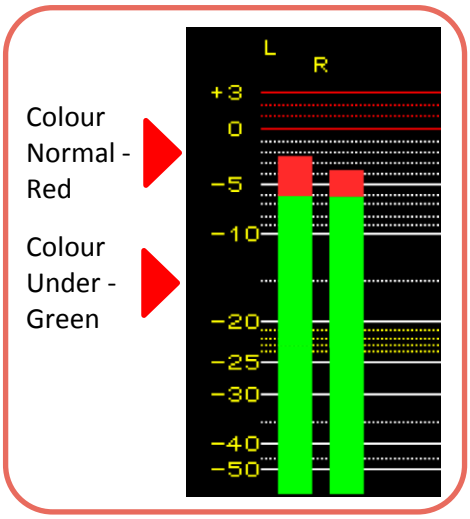
Please refer to the 'Moving Coil Emulation' section in the Instruments chapter for more info.

Bar-graph Width – Manual

The Bar-graph Width allows you to alter the width of each bar-graph being displayed.
In order for the Bar-graph Width to work, please ensure that you have selected 'Normal' under the Display Mode folder.

Colour Normal

The DK Meter allows you to define a threshold where you might completely customize each bar-graph colour above and below.
The 'Colour Normal' sets the color of each bar-graph when above the defined threshold.
The Threshold is defined in the 'Under Level' folder.



Colour Under

The 'Colour Under' sets the color of each bar-graph when below the defined threshold.

Under Level

Range: 0 to -20dB
The 'Under Level' sets the Above/Below threshold relative to the maximum of the scale selected.

Window Text

The Window Text Read Out allows you to customize what parameter each of the four Text read outs in the top the DK Meter screen displays.
The same parameters may be edited via the Quick Setup menu; Windows Text Read out.

StarFish™ Setup

The StarFish™ setup gives you access to setting up and defining your StartFish™ and JellyFish™ appearance.

Colour

Select the basic display colour of the StarFish™/JellyFish™.
Blue, Green, Light Blue, Red, Violet, Yellow.

Compressor

The compressor section allows for different performance parameters to be set up.
Fast / Slow parameters controls the Phase correlation responds time. In particular when reviewing phase relation of low frequency content, the 'slow' position might come in handy.

The Gain On/Off parameter allows the Goniometer and StarFish™/JellyFish™ to always in a relevant size, but adding gain to increase the visual appearance of each of the instruments.
The gain is evenly distributed meaning that the channel relationship is kept complete and can always be trusted to give a correct representation.

OP-Mode

The operating mode allows you to choose between running the StarFish™ or JellyFish™.
Please refer to the instrument section for further information on each of the two.

Window Height

The window height, allows you to define whether you want a large or a small version of the Gionometer/StarFish™/JellyFish™ instrument on the display.

Loudness Preset

The Loudness setup parameter allows you to select between a number of standardized or recommended Loudness settings including:

R128	ATSC A/85	LEQM
BCAP	TV2 DK	ABC-TV LA
HRTV-23FS	ARIB	AGCOM 219

If you select 'User' the loudness setup may be completely customized to exactly your specifications in the Loudness Setup Folder (please see next paragraph).

Loudness Setup

The Loudness Setup folder allows you to customize the loudness settings of your meter.
You may use one of the Loudness presets as a starting point, but in order for the customized loudness setting to be saved, the 'User' loudness preset has to be selected.

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Tip: Select the Loudness Preset that comes closest to your desired loudness setting, then select the 'User' Loudness Preset in order to customize the details.
Your changes will now automatically be saved to the current preset.

Filter

Range: K-FILTER or LEQM.
Two different scales have been adopted for displaying the loudness value. One of these is defined by the ITU in their document ITU BS1771 and that uses "Loudness Units" - LU. These have values ranging from -18 to +9 with the typical aiming point for signals being a specification close to the 0 point. The other commonly used scale has only negative values going down from a 0 LUFS mark at the very top of the scale.

Short-term Window

Range: 0, 3, 10 or 30 seconds.
The currently displayed loudness value is based on the averaged loudness values over a defined time window. Setting the window to 0 provides a display of values that are as instantaneous as the system permits. The window can be adjusted to be 0, 3, 10 or 30 seconds.

Reference

Range: -9 and -24 dBFS (1 dB steps).
A range of Reference levels can be chosen for the purpose of loudness measurement as part of the loudness measurement standard which your organization (or client) has adopted.

Peak Level

Range: -1 to -10 dBFS (1 dB steps).
The Peak level is a user defined reference point.
The peak level is dependent on the setting of 'Peak Mode';
True Peak or Digital (Sample Peak).
When the signal passes above the peak level, the Peak level readout will turn Red.

Gate Level (-a)

Range: -8 to -20 dB (1 dB steps).
It is often the high level parts of a program which are often of most interest for assessing compliance with broadcast criteria. To prevent an extended length of low level program content reducing the averaged loudness value to a degree that affects the measured value, the meter has an optional gating function. Once the signal drops below the gate threshold, the meter will continue to hold, display and use for averaging purposes, the previous value that was above the threshold. Setting it to -20 causes the gate to remain open and the unit displays the actual loudness for the vast majority of the time.

Gate Level (-b)

Range: Floating or Absolute.
The gate level can be an absolute value or a floating one. Absolute values offer a degree of simplicity but at the risk of a high setting causing gating of quieter sections which might sometime comprise a significant part of

material such as a feature film soundtrack. Adopting a low absolute value can cause background noise that is at a relatively high level (for example a documentary by a waterfall) not to be gated out, even though it is not a significant contributor to the perceived loudness. Making the gate level relative may then offer results that more closely reflect perceived program loudness.

Peak Mode

Range: Digital or True Peak.
Selecting Digital will base the reading on individual sample values.
True Peak uses oversampling to create the maximum intersample peak possible taken from the maximum value of the interpolated waveshape.

Reference

This is the frequency chosen for the calibration alignment and is either 400 or 1000 Hz.

Capture

The Loudness capture functionality may be changed between two different modes; Start-Pause and Auto-Start.

Loudness measurement or Capture is essentially always done over a timespan - hence, it is necessary to define when the Loudness capture starts and stops.
As explained in the Loudness & Terminology section, several different Loudness measures are relevant i.e. Momentary Loudness, Short-term Loudness, Integrated Loudness and Loudness Range – all time dependent.

The Start-Pause Mode
Is in effect a manual mode that allows you to decide when the Loudness capture starts, pauses, restarts or is reset.
In all meter views, a 'Reset' and 'Start/Pause' button are supplied.
The button expresses the Loudness capture state the meter is in, e.g. 'Start' indicates that the Loudness Captured has been started.
Loudness Capture is dependent on the incoming signal being higher than -70dBFS.

When starting the Loudness Capture, the button name will switch from 'Pause' to 'Start' given that the incoming signal is above -70dBFS.
In case the signal is not above -70dBFS, this will be indicated by the 'Start' button being black.

During the Loudness capture, you may now toggle the capture between 'Start' and 'Pause'. The overall resulting loudness readings will express the summarized capture of all audio above -70dBFS from the last Reset.

Hitting 'Reset' will re-initiate the Loudness Capture and measures.

Overall, the Start-Pause mode allows you to manually start and stop the capture during breaks or audio that you do not wish to consider in the overall loudness readings.

Note: As per the BS1770 standards, audio below -70dBFS is not included in the overall loudness capture. This is to avoid that breaks or silence in the audio undermines the loudness readings.

Auto-Start Mode

The Auto-Start mode, has controls and options similar to those of the Start-Pause Mode, with the addition of an automatic start/reset facility triggered by the audio level.
More specifically, if the audio is higher than -70dBFS, the Loudness Capture is automatically started, as well as being automatically stopped and Reset when the audio drops below -70dBFS again for more than 2 seconds.

This mode is particularly handy when working with smaller bits of audio, and frees you from having to manually reset the loudness capture every time you want a new reading.

Loudness Option

The Loudness option section allows you define what loudness parameter you wish displayed as the Loudness bar-graph.

> *Note: Enabling a Loudness Bar-graph requires audio to be routed to the relevant bar graph position. This may be done through the Quick Setup Menu; Input and Channel Order folder or the Advanced Menu; Matrix Output Assign folder.*

The Loudness parameters available for display are the following:

- Momntry – 'Momentary Loudness'
- Shorttrm– 'Short-term Loudness'
- Integrt – 'Integrated Loudness'
- None – Meaning no Loudness Bar graph displayed

Labels Assign

The Labels Assign folder allows you to customize naming and labeling of both sources and channel roles.
Please refer to the Meter Setup and Audio Routing section for more information.

Audio Global

Analogue References

The analogue reference sets the sensitivity of the analogue input.
In essence the sensitivity decides how many dBU it takes to fully reach maximum input or 0dBFS.

Downmix settings

The Downmix settings are used for allowing a stereo down-mix to be created and viewed from an incoming surround set of channels.
The 'Output gain' is the attenuation compensating for potential clips when joining the 6 channels together.
'Center to L/R' sets the that the Center channel is mixed by.
'Mode' decides whether the Downmix facility is on or off.

Labels

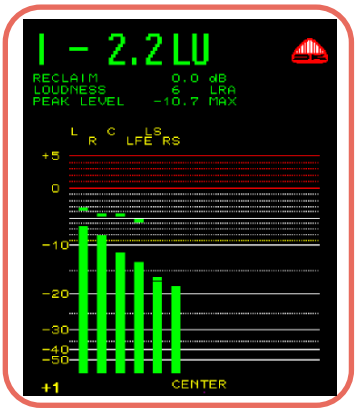
The Labels section allows you to customize names of presets as well as signals, also to referred to as the Global Label Master.
Please see the Meter Setup and Audio Routing section for further information.

Colour

The Colour parameter defines the colour scheme of the meter, most notably on the Window Text Read outs.

Instruments & Display Tools

Bar-graphs

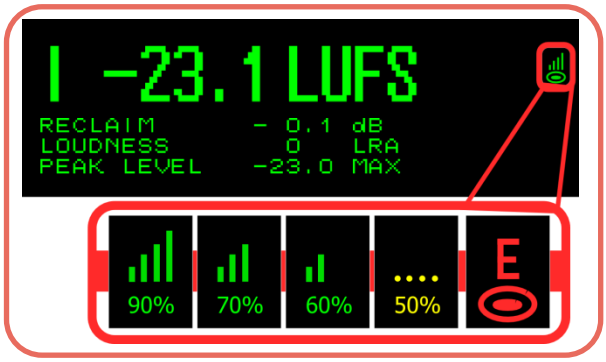


The standard bar-graphs can be used to view numerous different representations of the incoming audio e.g. level according to the selected scale, various loudness parameters, sum/difference and more.
The maximum number of channels viewable depends on the specific DK Meter model and software feature package you have. Please refer to the DK Meter family section for further information.

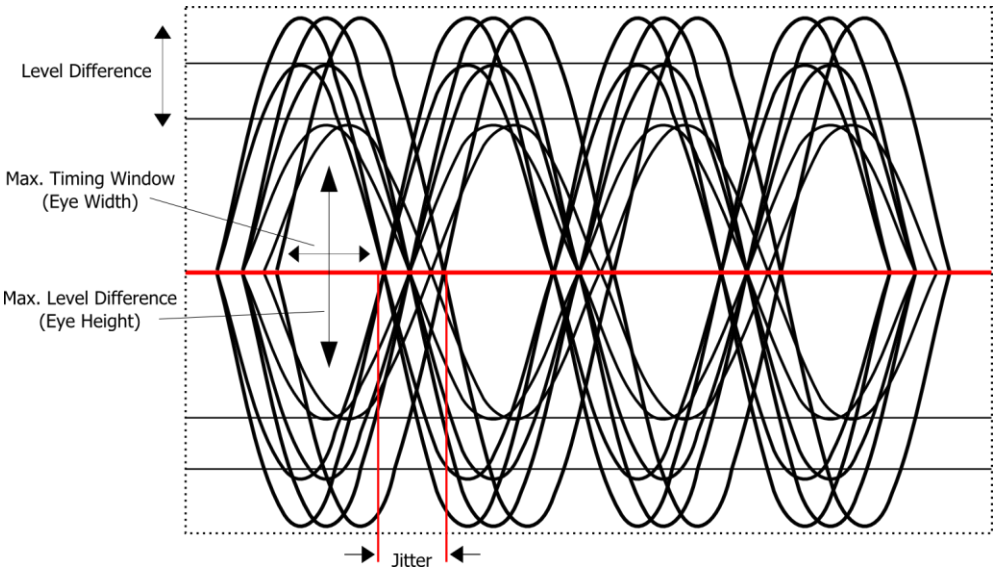
Eye Width

Range: 10% - 100%
All SDI capable DK Meters feature the Eye Width Parameter as default feature.
Inspired by cell phone reception indication, Eye Width expresses the immediate quality of the incoming SDI signal and allows you to constantly monitor this to avoid any drop outs and instabilities.

The background for the Eye width feature has its starting point in the data eye diagram, typically used to depict deviation in amplitude and timing of the incoming data stream. By folding the parts of the waveform corresponding to each individual bit into a single graph, the eye pattern represents an average statistic of the incoming data and the eye opening expresses the signal quality in terms of amplitude (level difference and timing difference (jitter).



Eye Width, as the name suggests, is concerned with the width of the eye pattern, focusing primarily on the timing differences which can also be measured as jitter. While not being an actual jitter measurement, Eye Width expresses the eye pattern max. timing window as a percentage of the ideal, where 100% width is the theoretical optimal signal with no quality loss (90% is likely to be the max. in real life), and 10% width the worst case scenario where most products will be unable to the lock onto the signal.



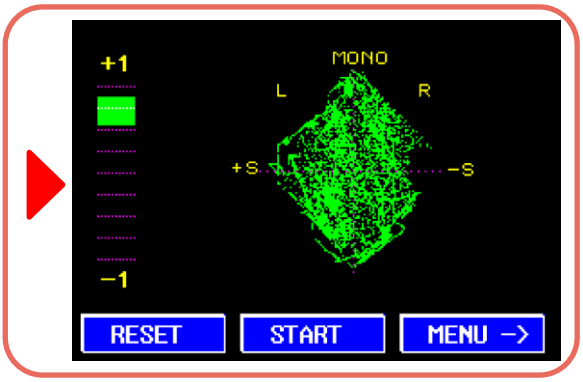
AES Lock Indication

The AES enabled DK Meters feature an AES lock indicator, allowing you to instantly confirm that the meter is locked onto the incoming signal. When clocking to an incoming AES signal, AES1 needs to be fed the master clock. Given that a valid clock and lock is achieved, AES1 will light up green.
The corresponding AES inputs will be green when valid data is received in sync with the incoming clock on AES1.

Note: DK Meter has an internal clock hierarchy that first attempts to lock onto the SDI input. If no valid clock is found DK Meter will proceed to attempt locking to AES1. If no valid lock is found, DK Meter will fall back on its internal 48kHz clock.

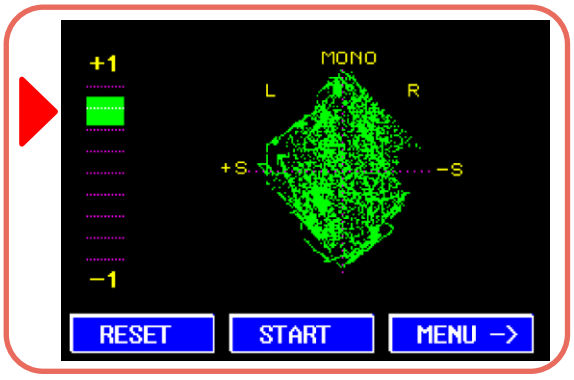
Goniometer – Vectorscope

The Goniometer is automatically chosen when StarFish™ or JellyFish™ are enabled and only 2 channels are routed to the Bar-graph section (please the Matrix section for further details).
The Goniometer or Vectorscope, displays phase and amplitude information on the Left and Right input channels.



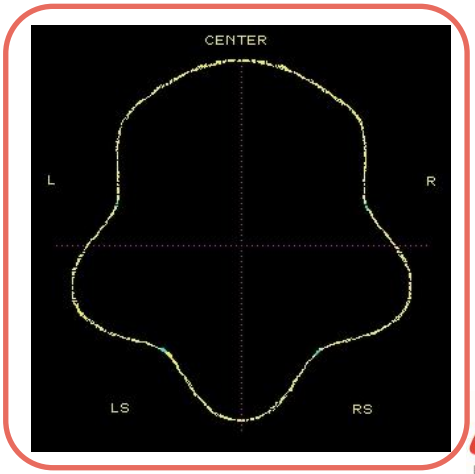
Phase correlation

When the Goniometer, StarFish™ or JellyFish™ are selected, the left most part of the display is a phase bar-graph with purple graticule lines. This displays information on the main left/right inputs, with the factory supplied default for this being the first AES input. Other signals can be chosen using the internal matrix.
Audio meters are rarely used to display pure sine waves and the term "in-phase" is applied here meaning a signal where the mono sum is equal to or greater than the higher of the left and right signals. "Out of phase" is a signal where the mono sum would be less than the higher of the left and right signals.
Signals which are predominantly "in phase" have a green marker in the upper half of the range. Fully correlated signals such as double mono read on the +1 mark. Signals which are "out of phase" are shown with a red marker in the lower half of the range.
With no input, with only the left or right driven or with correlated mono but with a 90 phase shift, the marker position is the halfway point with the upper section of the marker green and the lower part red.



StarFish™

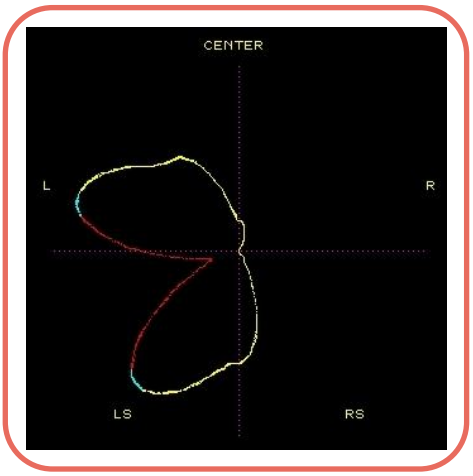
The StarFish™ is the development in the JellyFish™ surround audio display, developed by DK-Technologies many years ago. It provides a picture of a 5.1 surround audio field. The display has the front center channel arranged towards the top with other directions as marked.



The image here shows the StarFish™ display with equal audio on all legs. Typical sound fields have energy in a variety of directions and more complex shapes are created which give an indication of the directions having significant amplitudes. Unlike the earlier JellyFish™ display which with the same signal would have shown a circle, the StarFish™ takes into account the summation occurs when there is coherent (in-phase) content between legs such as left and centre. Polarity inverted (out of phase) signals can cause the shape to be pulled inwards towards the centre point, reflecting the perceived cancellation that occurs.

A yellow coloured trace indicates that there is a high degree of coherent signal content.
When the signals are largely un-correlated, the trace becomes blue.

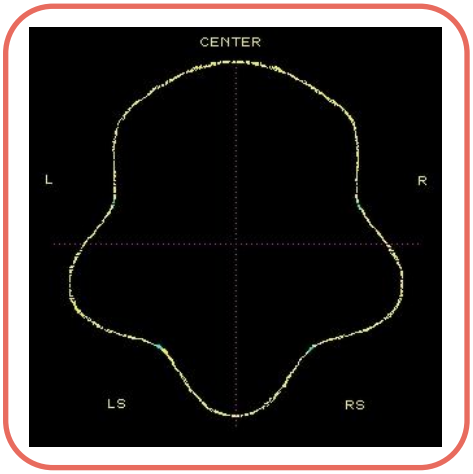
When the predominant content is polarity inverted, a red section of trace shows highlights that might have produce a phasing problem. The randomness of typical surround signals means an occasional glimpse of red should not be a cause for concern, though red showing for extended periods should be investigated as it can be a sign of a signal that will not fold-down well into stereo and mono.



JellyFish™

DK Technologies' trademark 'JellyFish™' display was first launched on audio only meters. It was later developed to provide the alternative 'StarFish™ display and both included in the DK Meter. Both modes provide a picture of the surround audio field in 5.1, 6.1 or 7.1 channel modes. The display has the front centre channel arranged towards the top with other directions are marked.

The image here shows the StarFish™ mode with equal audio on all legs. In JellyFish™ mode, the same signals would produce a circular display. Typical sound fields have energy in a variety of directions and more complex shapes are created which give an indication of the directions having significant amplitudes.



Surround display size

The default setting places an audio compressor in the drive to the surround display. This provides a relatively consistent display size from which phase indications can easily be read, which is the primary purpose of the surround display, amplitude being read from the bar-graphs.

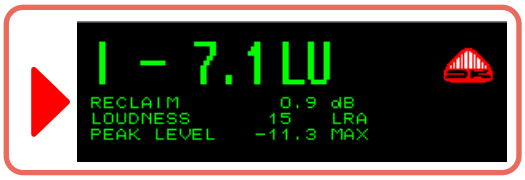
Loudness Bar-graph(s)

The Loudness Bar-graph enables your loudness readings to be monitored side-by-side with the regular amplitude bar-graphs.
The specific loudness parameter displayed on the Loudness Bar-graph may be set in the Quick setup menu; Input and Channel order, or in the Advanced Menu; Meter Setup/Loudness Option.
In addition to the loudness reading, Start/Reset buttons for initiating and resetting the overall Loudness Capture are supplied as well. These are described in detail in the Loudness Setup - Capture section.

Meter Text Read-Outs

The four Meter Text read-outs allow for completely customized view of four parameters in addition the regular audio tools.
The custom setup of each of the four read-outs may be set in the Quick Setup menu; Window Text Read-out or the Advanced Menu; Meter Setup; Windows Text

Reclaim Factor



The Reclaim factor indicates how much you can increase your signal while still staying within your loudness target.
The Reclaim Factor is essentially the difference between the absolute gated loudness and the dynamic gated loudness.
By making sure that your material is always above the dynamic gate threshold, the reclaim factor ensures optimal loudness within the given standards.

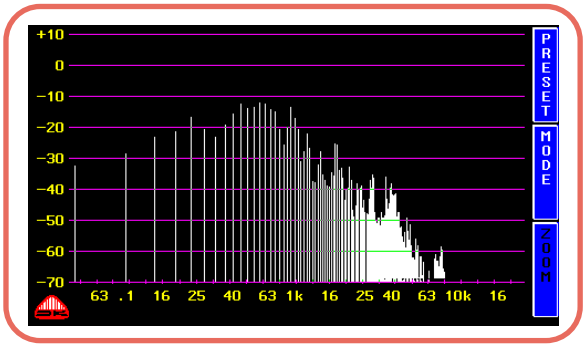
Graphical Loudness

Loudness values can be shown graphically against time using the Graph LEQ function.
The Graphical Loudness display allows for up to 3 minutes of loudness to be mapped against time.
The Graphical Loudness view is reached by sliding once to the left of the basic Bar graph display (view 2).

After hiding the Analyzer panel, the left panel part of the screen shows the individual audio level bar-graphs for the elements that make up the surround (or stereo) signal.
The bar-graph in the right panel shows the instantaneous loudness value.
The Loudness Capture functions are described in detail in the Capture section.
The 'Integtr'/'Shorttrm' button allows for toggling between the two different Loudness measures.

In addition to the graphical loudness, the Peak and Peak hold functions are also made available in the Graphical Loudness display.
The Peak button, enables/disables the flying peak of the bar graphs across all meter views.
Similarly, the Hold button enables/disables the peak hold function across all meter views.

FFT Spectrum Analyzer



The FFT is a default function of the DK4 meter and is optionally availably for DK1, DK2, and DK3.
Slide all the way to the left on your meter views to reach the FFT.
The FFT (Fast Fourier Transform) analyzer function performs a 1024 band audio spectrum analysis function.

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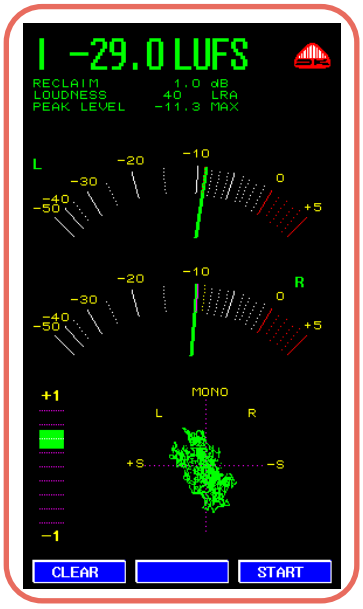
The FFT features a x10 Zoom function, allowing a more precise view of the audio spectrum.
Furthermore, the FFT allows for pointing to a specific frequency pin for detailed readings, by using the 'Cursor' button.
Hit the 'Cursor' button and use the 'Move' buttons to point to the desired frequency pin.
Once the relevant frequency pin has been selected, the 'SetRel' function (Set Relative Level) allows you to align the overall FFT level using the current pin as the reference point.

Moving Coil Emulation



The DK Meter features a Moving Coil emulation in two different modes replacing the standard Bar-graph indication.
The Moving Coil emulation is enabled in the Advanced Setup menu; Meter Setup/Display mode.
The Moving Coil mode allows for up to four moving coils simultaneously. The StarFish/JellyFish™, Goniometer and Phase correlation may still be displayed in addition to Moving Coils.

The Dual mode allows a single moving coil arc to display two signals by using a dual Needle Concept.
The specific signals displayed depend on the signals routed in the Matrix Output Assign folder e.g. Left/Right or M/S.
Please refer to the Matrix Output Assign section for more information.

How to.....

How to get landscape and MSD View

The DK4 features the classic MSD landscape View. This facility is optionally available for DK1, DK2 and DK3.
The MSD View is reached by simply 'sliding' your finger from left to right until you reach meter view 4.

How to enable FFT spectrum analyzer

The DK4 features the FFT Spectrum Analyzer. This facility is optionally available for DK1, DK2 and DK3.
The FFT is reached by simply 'sliding' your finger from left to right until you reach meter view 5.

How to set Analog input sensitivity

DK1, DK2 and DK4 features analogue stereo input. The same input is optionally available for DK3.
To set the sensitivity level of the analogue input, go to Advanced Setup/Audio Global/Anlogue References.

How to switch to Moving Coil Emulation

The Moving Coil Emulation is available for every DK Meter. The Moving Coil emulation is enabled in the Advanced Setup menu; Meter Setup/Display mode.
The Moving Coil mode allows for up to four moving coils simultaneously. The StarFish/JellyFish™, Goniometer and Phase correlation may still be displayed in addition to Moving Coils.
Please refer to the Instrument; Moving Coil Emulation for more information.

How to change the Bar-graph width

The graphical width of each bar-graph may be altered in the Advanced Setup; Meter Setup/Bar-graph width folder.

How to customize Window Text Read out

The Window Text Read out may be customized in the Quick Setup menu; Window Text Read Out folder.
More detailed options are available in the Advanced Setup; Meter Setup Window Text folder.

How to Software update

DK-Technologies constantly develops new software features, facilities and adjustments to adhere to all relevant scale and Loudness recommendations.
It is therefore recommendable that you, once in a while, check for new updates for your Meter on:
www.DK-Technologies.com

DK-Technologies
dkMeter Update.
Your dkMeter have the latest software installed.
The software package was released 2012-12-10.
If you wish you can reinstall the software.
This package contain release 2012-12-09 of the DSP software. It also contain version 1.20 of the MCU software and firmware v.82.
The software package available is a factory update which will reset your settings to factory defaults.
Proceed with the update
dkMeterOnline Version 1.3.2.1
Advanced
Exit

Every DK Meter can easily be software updated via the inherent USB connector.
Please follow these instructions to software update:

- Go to www.DK-Technologies.com
- Go to the DK Meter product page
- Locate the dkmeteronline.exe tool and download
- Connect the DK Meter to your computer
- Launch the dkmeteronline application
- The dkmeteronline application will automatically check for latest software for your meter specifically.
- Follow on-screen instructions to load the latest software.

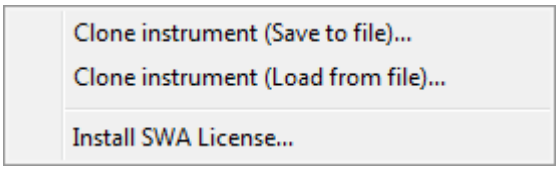
Please see more information in the DK Meter Online Application section of this manual.

How to Upgrade your meter

DK Meters have the ability to be upgraded with additional features and functions.
Please contact your local DK-Technologies representative for further information on how to upgrade

How to Clone the settings from one unit to another

DK Meter units may be 1:1 cloned for easy standardization of multiple meters.
A cloning essentially involves copying every setting, preset, software and firmware from one meter to another.
Therefore it is advisable to ensure that the latest software is loaded in the 'Master' meter at the very minimum.
Please follow these instructions to clone a DK Meter:



- Go to www.DK-Technologies.com
- Go to the DK Meter product page
- Locate the dkmeteronline.exe tool and download
- Connect the master (to be cloned) DK Meter to your computer
- Launch the dkmeteronline application
- Hit the 'Advanced' button and select *'Clone Instrument (save to file)'* - Specify location
- Disconnect the master DK Meter and connect the target Meter to become the clone
- Hit the 'Advanced' button again and select *'Clone Instrument (load from file)'* – Select location
- Your target Meter is now an exact clone of your Master Meter.

Note: Only meters identical on hardware and software options may be cloned

Loudness & Terminology

About Loudness

Loudness measurements differ from conventional signal amplitude measurements in that they are also influenced by the frequency content of the signal and the duration of transient components. The way these various elements are handled to give a value for display has been defined by the International Telecommunications Union in their standard ITU BS1770 which is the only loudness standard to have achieve any degree of international acceptance.
The DK Meter allows a number of parameters to be adjusted to suit whatever options your organisation and perhaps regulatory body has decided to mandate.
Two organisations leading the way in the standardisation of loudness measurements are the Advanced Television Systems Committee (ATSC) in the USA and the European Broadcasting Union (EBU) in Europe. The background information to the measurement norms is contained in the ATSC document "Techniques for establishing and maintaining audio loudness for digital television", document A/85:2011. The EBU document R128 is supplemented by EBU Tech 3341, 3342, 3343 and 3344 between them they define a number of terms and set out the reasons behind many of the objectives of loudness measurements.

Terminology

The Loudness world includes a number of terms and abbreviations worth noting:

Loudness Range (LRA)
Loudness range is a statistic calculation of the material's dynamic range based on the short term (sliding) loudness (3 secs).
Loudness Range is abbreviated 'LRA'.

Momentary Loudness (M)

Momentary loudness is the sum of the RLB weighted audio channels and integrated over 400ms. Momentary loudness is used to calculate short term and integrated loudness
Momentary Loudness is abbreviated 'M'.

Short Term Loudness (S)

Short term loudness is a 3 seconds integration of the momentary loudness. (10 and 30 seconds are also used in some standards/regions).
Short Term Loudness is abbreviated 'S'

Absolute Gated Integrated Loudness

The absolute integrated loudness is a long term measurement (an integration over the entire material) based on the momentary loudness.
It uses an absolute gate at -70LUFS/LKFS (M) which means that if the momentary loudness is getting under -70LUFS/LKFS then the measurement holds until the momentary loudness goes above.
The absolute loudness is not used directly by the user, but is used to calculate the dynamic

gate. The dynamic gate is, according to ITU-R BS.1770-2, -10 LU below the absolute gated loudness.

Dynamic Gated Integrated Loudness (I)

The dynamic gated loudness is a long term measurement (an integration over the entire material) based on the momentary loudness.
It uses a dynamic gate at -10 LU under (dB relative to) the absolute gated loudness which means that the measurement is on hold if the momentary loudness gets under the dynamic gate.
It is always the last value of the dynamic gate which is used on the material. This means that it is necessary to include or exclude any material from the “past” if the dynamic gate is changing. This means that the dynamic gate is always -10 LU under (dB relative to) the end result of the dynamic gated loudness.
The dynamic gate level may vary with local requirements.
Dynamic Gated Integrated Loudness is abbreviated ‘I’

True Peak (TP)

True peak measurements, not only looks at the actual samples, but also inter-sample peaks.
This means that True Peak metering will indicate peaks that would potentially cause distortion when converter in e.g. digital-analogue converters, sample rate converters and data compression codecs.
True peak is therefore a highly relevant tool when performing normalization of source material.
DK-Tech approach

LUFS, LKFS and LU

The three LU, LUFS and LKFS are essentially addressing the same issue, which sometimes cause some confusion.
LKFS is the K-weighted loudness scale and one unit on this scale is equal to one dB.
LUFS is identical to LKFS. ITU-R BS.1770-2 and ATSC are using the terms LKFS, while EBU R128 are using LUFS – both are expressing the identical scale.
0 LUFS/LKFS is equal to 0 dBFs @ 1KHz according to ITU-R BS.1770-2 and EBU R128 (some recommendations may use 400Hz).

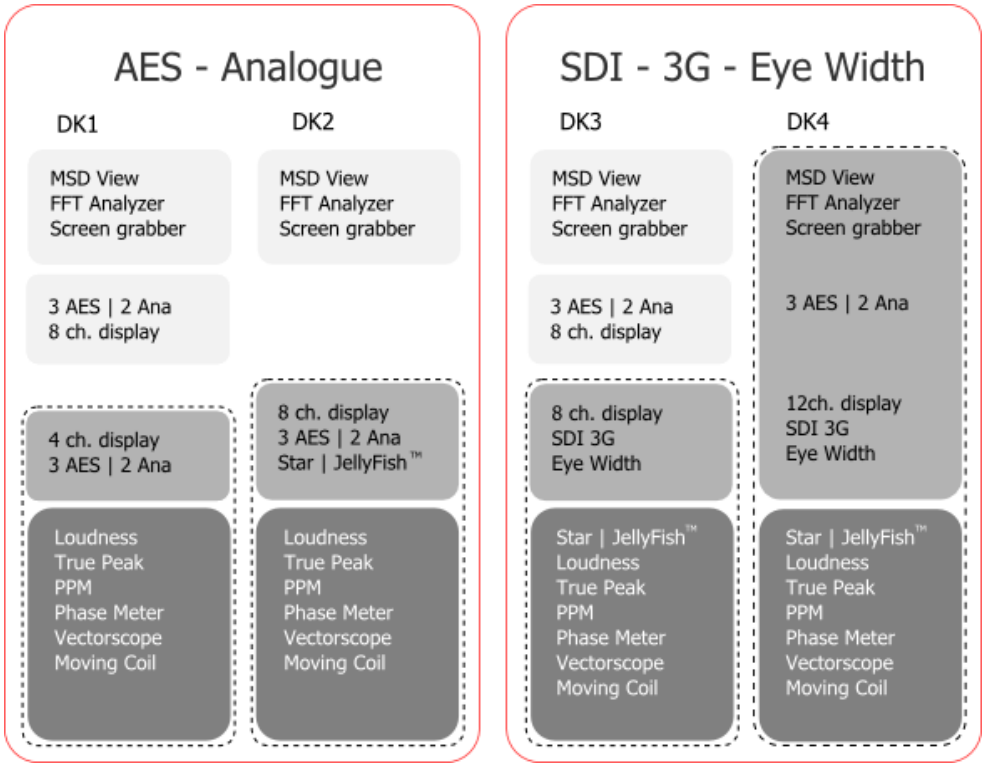
LU stands for Loudness Unit, and is a scale relative to the chosen Reference level.
0 LU is equal to the reference level. The reference level will vary between the different Recommendations e.g. EBU R128 has 0 LU = -23 LUFS.
One LU is equal to one dB

Other Relevant Info

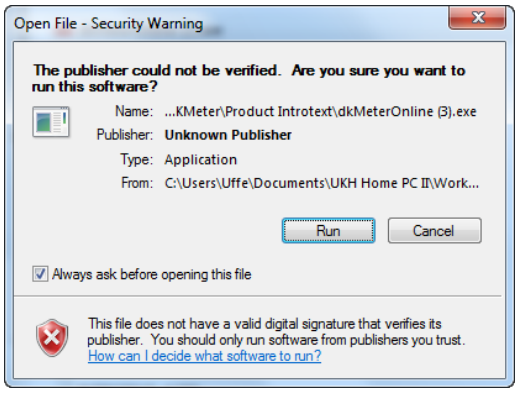
The DK Meter Family

The DK Meter family holds several different models including DK1, DK2, DK3 and DK4 all with their individual feature set and upgrade options.

This figure will give you a quick overview of what product includes which functions and features and what might be achieved through the option program:



DK Meter Online Application (PC Software)


Open File - Security Warning
The publisher could not be verified. Are you sure you want to run this software?
Name: ...KMeter\Product Introtext\dkMeterOnline (3).exe
Publisher: Unknown Publisher
Type: Application
From: C:\Users\Uffe\Documents\UKH Home PC II\Work...
Run
Cancel
Always ask before opening this file
This file does not have a valid digital signature that verifies its publisher. You should only run software from publishers you trust.
How can I decide what software to run?

The DK Meter Online Application may be used for updating software, installing software licensing as well as cloning your meter settings to another DK Meter.
The DK Meter Online Application can be found on www.dk-technologies.com

Connect your DK Meter to your computer (PC).
Install DK Meter Online on your computer.
You may experience the Windows security warning, in which case you simply hit 'Run'.

Once installed the DK Meter Online app. Will identify your meter and check for the newest available software for your meter.
By hitting the Advanced button, you gain access to the Cloning (saving and loading from file) facility, as well as the ability to install a software license key that you may have acquired for your DK Meter.

DK-Technologies
dkMeter Update.
Your dkMeter have the latest software installed.
The software package was released 2012-12-10.
If you wish you can reinstall the software.
This package contain release 2012-12-09 of the DSP software. It also contain version 1.20 of the MCU software and firmware v.82.
The software package available is a factory update which will reset your settings to factory defaults.
dkMeterOnline Version 1.3.2.1
Advanced
Exit
Clone instrument (Save to file)...
Clone instrument (Load from file)...
Install SWA License...

Signal connections

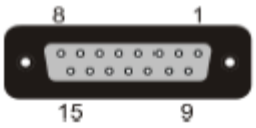
Included Signal Cable

The supplied cable harness has three BNC connectors. These allow three AES-3id digital audio signals to be connected to the 75 ohm inputs. Because each AES input is a dual channel path, up to six digital mono signals can be brought into the meter. These can be either 16 or 24 bits in depth and the intended sample rate is 48K. An internal matrix allows the required signals to be routed to the measurement and display system. SPDIF signals can also be connected and are accepted.
The meter also has two balanced analogue inputs and if required, the matching cable may be acquired from DK-Technologies.

D-Sub Connector Pin-out

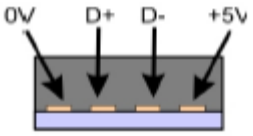
The 15 pin connector is shown from the wiring side of the cable mounted male connector.
Pins 5 and 13 are used for factory diagnostics only and it is essential they are left unwired.DK-Technologies A/S
Page DK Meter

Signal	Type	Pin	Signal	Type	Pin
AES 1	Signal	3	USB	Data +	2
AES 2	Signal	4	USB	Screen	Shell
AES 3	Signal	12	Analogoue L	Hot	6
AES	Ground	11	Analogue L	Cold	14
USB	0V	1	Analogoue R	Hot	8
USB	+5V	9	Analogue R	Cold	15
USB	Data -	10	Analogue	Ground	7



USB

The USB connector is as seen looking into the end of the cable mounted connector that can connect to a computer.



DK3 and DK4 meters

The 15 pin D connector is still used for any available audio format inputs, power and data connections. The SDI video format signal input is on an internally terminated 75 ohm BNC connector. The other BNC provides a buffered loop through of the incoming signal which may be in SMPTE format 424M, 259M or 292M - SD or HD SDI signals at data rates up to 2.97 Gbit/sec (3G).

Specifications

	DK1	DK2	DK3	DK4
Audio Connectors				
Meter Connector	15-pole D-Sub	15-pole D-Sub	-	15-pole D-Sub
Analogue input	2 XLR input	2 XLR input	-	2 XLR input
AES input	3 BNC (AES3-4-2009)	3 BNC (AES3-4-2009)	-	3 BNC (AES3-4-2009)
Video Connectors				
SDI In	-	-	BNC 3G/HD/SD SDI	BNC 3G/HD/SD SDI
SDI Out	-	-	BNC 3G/HD/SD SDI (active loop through)	BNC 3G/HD/SD SDI (active loop through)
Bit Resolution	24 bit	24 bit	-	24 bit
Group Delay	1.75msec	1.75msec	-	1.75msec
Nominal input imp.	75 ohm	75 ohm	-	75 ohm
S-rate int. /ext.	48kHz	48kHz	48kHz	48kHz
Analogue Input				
Input type	Balanced (electronic)	Balanced (electronic)	-	Balanced (electronic)
Dynamic range	>103dB	>103dB	-	>103dB
Crosstalk	<96dB	<96dB	-	<96dB
SNR	typical 93dB relative to -1dBFS	typical 93dB relative to -1dBFS	-	typical 93dB relative to -1dBFS
Nominal input Imp.	>20kOhm	>20kOhm	-	>20kOhm
Maximum input level	24dBu	24dBu	-	24dBu
Freq. resp. 20Hz-20kHz	+/-0.3dB	+/-0.3dB	-	+/-0.3dB
Loudness				
Compliant with...	ITU BS1770-2, EBU R128, A/85, ARIB	ITU BS1770-2, EBU R128, A/85, ARIB	ITU BS1770-2, EBU R128, A/85, ARIB	ITU BS1770-2, EBU R128, A/85, ARIB
Reference Level digital	-12dBFS & -24dBFS	-12dBFS & -24dBFS	-12dBFS & -24dBFS	-12dBFS & -24dBFS
Dynamic gate level	-2LU dB to -20LU/Off	-2LU dB to -20LU/Off	-2LU dB to -20LU/Off	-2LU dB to -20LU/Off
Short term int. window	0 to 30 seconds	0 to 30 seconds	0 to 30 seconds	0 to 30 seconds
Num. Loudness	LRA	LRA	LRA	LRA
True Peak	Flying peak & Num.	Flying peak & Num.	Flying peak & Num.	Flying peak & Num.
Peak thrs. / hold time	-2dBFS / >0.5sec	-2dBFS / >0.5sec	-2dBFS / >0.5sec	-2dBFS / >0.5sec
Power				
Consumption	350mA	350mA	350mA	350mA
Power Supply	Plugtop, 100-240V, 5VDC, 500mA May be powered from Computer or USB hub	Plugtop, 100-240V, 5VDC, 500mA May be powered from Computer or USB hub	Plugtop, 100-240V, 5VDC, 500mA May be powered from Computer or USB hub	Plugtop, 100-240V, 5VDC, 500mA May be powered from Computer or USB hub